ABSTRACT

ELECTROSURGICAL JAW STRUCTURE FOR CONTROLLED ENERGY DELIVERY

A working end of a surgical instrument that carries first and second jaws for delivering energy to tissue. In a preferred embodiment, at least one jaw of the working end defines a tissue-engagement plane that contacts the targeted tissue. The cross-section of the engagement plane reveals that it defines a surface conductive portion that overlies a variably resistive matrix of a temperature-sensitive resistive material or a pressure-sensitive resistive material. An interior of the jaw carries a conductive material or electrode that is coupled to an Rf source and controller. In an exemplary embodiment, the variably resistive matrix can comprise a positive temperature coefficient (PTC) material, such as a ceramic, that is engineered to exhibit a dramatically increasing resistance (i.e., several orders of magnitude) above a specific temperature of the material. In use, the engagement plane will apply active Rf energy to captured tissue until the point in time that the variably resistive matrix is heated to its selected switching range. Thereafter, current flow from the conductive electrode through the engagement surface will be terminated due to the exponential increase in the resistance of variably resistive matrix to provide instant and automatic reduction of Rf energy application. Further, the variably resistive matrix can effectively function as a resistive electrode to thereafter conduct thermal energy to the engaged tissue volume. Thus, the jaw structure can automatically modulate the application of energy to tissue between *active* Rf heating and *passive* conductive heating of captured tissue to maintain a target temperature level.